Meeting Minutes Transmittal/Approval
Unit Managers' Meeting
200 Area Groundwater and Source Operable Units
3350 George Washington Way, Richland, Washington
December 1999

078813

0053210

APPROVAL: _____ Date 4/25/00
Bryan Foley, 200 Area Unit Manager, RL (H0-12)

APPROVAL: _____ Date 5-2-00
~~Jack Donnelly~~, 200 Area Unit Manager, Ecology (~~B5-18~~)

APPROVAL: _____ Date 4-28-00
Dennis Faulk, 200 Area Unit Manager, EPA (B5-01)

APPROVAL: _____ Date 4/25/00
Arlene Tortoso, Groundwater Unit Manager, RL (H0-12)

Meeting minutes are attached. Minutes are comprised of the following:

Attachment 1	–	Agenda
Attachment 2	–	Attendance Record
Attachment 3	–	200 Area UMM Minutes - December1999
Attachment 4	–	200-CW-1 Summary Maps
Attachment 5	–	200-BP-1 Prototype Hanford Barrier FY 2000 Scope
Attachment 6	–	200-TW-1 and 200-TW-2 DQO Schedule
Attachment 7	–	Project W-519 Infrastructure Support
Attachment 8	–	200 West Area Groundwater Contamination Update Presentation Overheads
Attachment 9	–	Carbon Tet Removal Graphs
Attachment 10	–	Carbon Tet Rebound Concentration Tables
Attachment 11	–	Monitoring Plan for ZP-2 for FY2000

Prepared by: Amy J. Jones Date 3/30/00

Amy J. Jones (H0-10)/Chloe Brewster

Concurrence by: _____ Date _____

Michael Graham, BHI Groundwater/Vadose Zone Integration (H0-09)

Attachment 1

UNIT MANAGERS' MEETING AGENDA

3350 George Washington Way
December 8, 1999

078813

8:00 – 10:00 a.m. 200 Area 1A14

- 200-CW-1 (15 minutes)
  - Status Work Plan
  - Status Fieldwork

- 200-CW-5 U Pond/Z Ditches Cooling Water Waste Group (10 minutes)
  - Status Work Plan
  - Status DQO Effort

- 200-BP-1 Operable Unit (10 minutes)
  - Summary FY00 Barrier Monitoring Work Scope

- 200-TW-1 and 200-TW-2 Operable Units (10 minutes)
  - DQO Development Schedule and Participants

- 200-CS-1 (15 minutes)
  - Status Work Plan
  - Status S-Pond Borehole Activity
  - Status on Construction Activities Crossing 216-A-29 Ditch

- 200-Area Common (30 minutes)
  - West Area Groundwater Presentation

- 200-ZP-1 (10 minutes)
  - Status of Pump and Treat System
  - Change-out of Packing Material

- 200-ZP-2 (20 minutes)
  - Monthly Monitoring
  - SVE Non-operational monitoring plan
  - Passive Systems
    Carbon Tet ITRD
  - Conference Call
  - PITT Proposal

Attachment 2

078813

Remedial Action and Waste Disposal Unit Managers' Meeting
Official Attendance Record – 200 Areas
December 8, 1999

Please print clearly and use black ink

PRINTED NAME	ORGANIZATION	O.U. ROLE	TELEPHONE
Curt Wittreich	ERC		372-5586
Mary E. Todd	ERC		372-9030
Dennis Faulk	EPA		6-8631
David G. Murillo	DOE/ORP		3-9179
Ted Wooley	Ecology		736-3012
Wayne Soper	Ecology		736-3049
George Henckel	BHI		372-9781
Stuart Luttrell	PNNL		376-6023
Evan Dresel	PNNL		376-8341
Virginia Rohay	ERC		372-9098
Garrett Day	ERC		372-9052
B.L. Foley	DOE-RL		376-7087
Bruce Ford	BHI		372-9176
Zelma Jackson	Ecology		736-3024
Steve Kowall	PNNL		
Brenda Becker-Khaleel	Ecology		736-3003
Arlene Tortoso	DOE		373-9631
Mary Furman	DOE		373-9630

MEETING MINUTES
GROUNDWATER AND SOURCE OPERABLE UNITS
UNIT MANAGERS' MEETING – 200 AREA
December 8, 1999

Attendees: See Attachment #2

Agenda: See Attachment #1

Topics of Discussion:

1. 200-CW-1

   - Status Work Plan - It was noted that the Waste Control Plan will be added to the references of the Waste Control Plan. DOE-RL is working on revisions to Part A, Bruce Ford (BHI) will set up a meeting to address this issue. Bruce Ford (BHI) provided the status of the TPA milestone package briefing held with RL management. Decisions required by the briefing are expected from RL within the next few weeks. EPA noted that its position that 200 Area work must be funded in FY01.

     The Nez Perce response letter is in RL concurrence. Both RL and EPA have received requests to meet with the Nez Perce.

   - Field Status - 200-CW-1 Summary Maps were provided (Attachment 4). The Gable Mountain Pond drilling is complete. A summary of work on the 28 test pits was provided and discussed. Geophysical logging is complete and the hydrazine data will be available next week.

2. 200-CW-5 U Pond/Z Ditches Cooling Water Waste Group - EPA has been briefed on the status of the DQO and Draft A of the Work Plan is on schedule to go to EPA on December 31, 1999.

3. 200-BP-1 Operable Unit - Copies of the 200-BP-1 Prototype Hanford Barrier FY 2000 Scope were provided (Attachment 5) and discussed.

4. 200-TW-1 and 200-TW-2 Operable Units - The 200-TW-1 and 200-TW-2 DQO Schedule was provided (Attachment 6) and discussed.

5. 200-CS-1

   - A-29 Crossing - David Murillo (DOE/ORP) provided copies of Project W-519 Infrastructure Support (Attachment 7). Following a presentation of the handout, the discussion centered on the permits that Ecology is involved in and how they relate to CS-1 and ORP activities.

   - Work Plan Status - The work plan is currently in a 30-day public review.

   - Borehole status - All the samples have been collected as planned.

6. 200-Area Common - Evan Dresel (PNNL) gave a presentation on the West Area Groundwater Contamination. Hardcopies of the overheads used in the presentation have been provided for inclusion in the meeting minutes (Attachment 8).

7. 200-ZP-1 - All of the packing material has been replaced and the old material was sent off site for disposal. A 500 gallon spill occurred during the packing material changeout. The readings on the spill were less than detectable and the spill was not reportable as an off-normal. New methods were tried for packing material removal, but due to problems which arose, it was decided that the old method should be used. The algae growth appeared to be preferentially distributed where there was greater sunlight exposure. The system is back online and operational.

8. 200-ZP-2

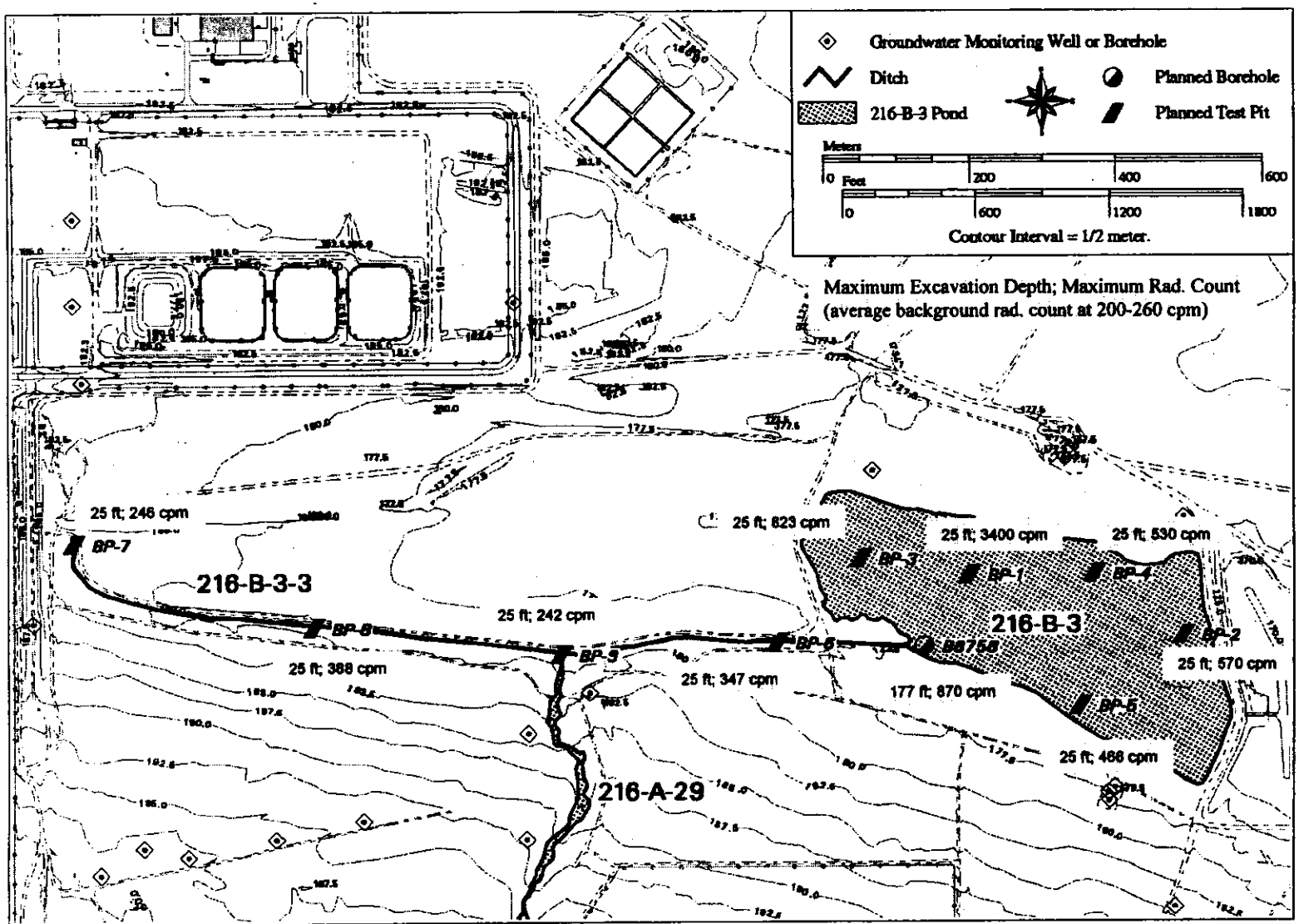
   - Monthly Monitoring Data - Carbon tet removal graphs for were provided (Attachment 9) as well as carbon tet rebound concentration tables (Attachment 10). The data was reviewed and discussed.

   - Monitoring Plan for ZP-2 for FY2000 - A copy of the monitoring plan was provided (Attachment 11). Both non-operational and passive system are included in the plan.

   - Passive Systems - Both GAC integrated sampling and B&K monitoring were summarized. EPA has deferred approval of the monitoring plan pending further discussion.

   - PITT proposal - EPA requested additional discussion on the priorities for the PITT proposal. EPA recommended that the project follow the recommendations of the PITT designer. RL noted that associated costs must be taken into consideration.

200-CW-1 B- Pond RI Test Pit, Borehole, and Geoprobe Summary

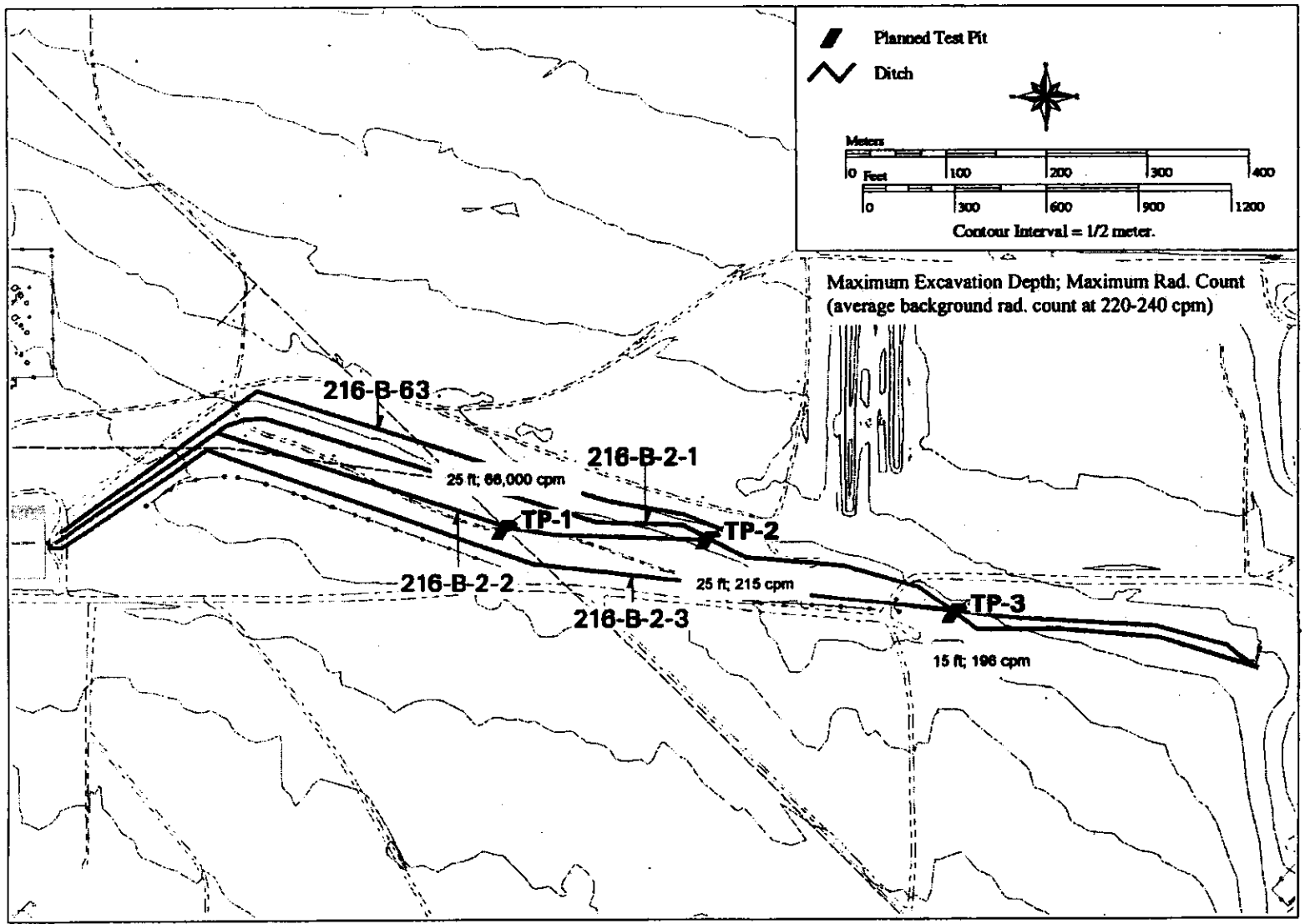


BH:spp 11/04/98 singleton_kw/figure5borehole.aml Database: 14-SEP-1999

12/08/1999

Attachment 4

200-CW-1 B-216-2-2 Ditch RI Test Pit Summary



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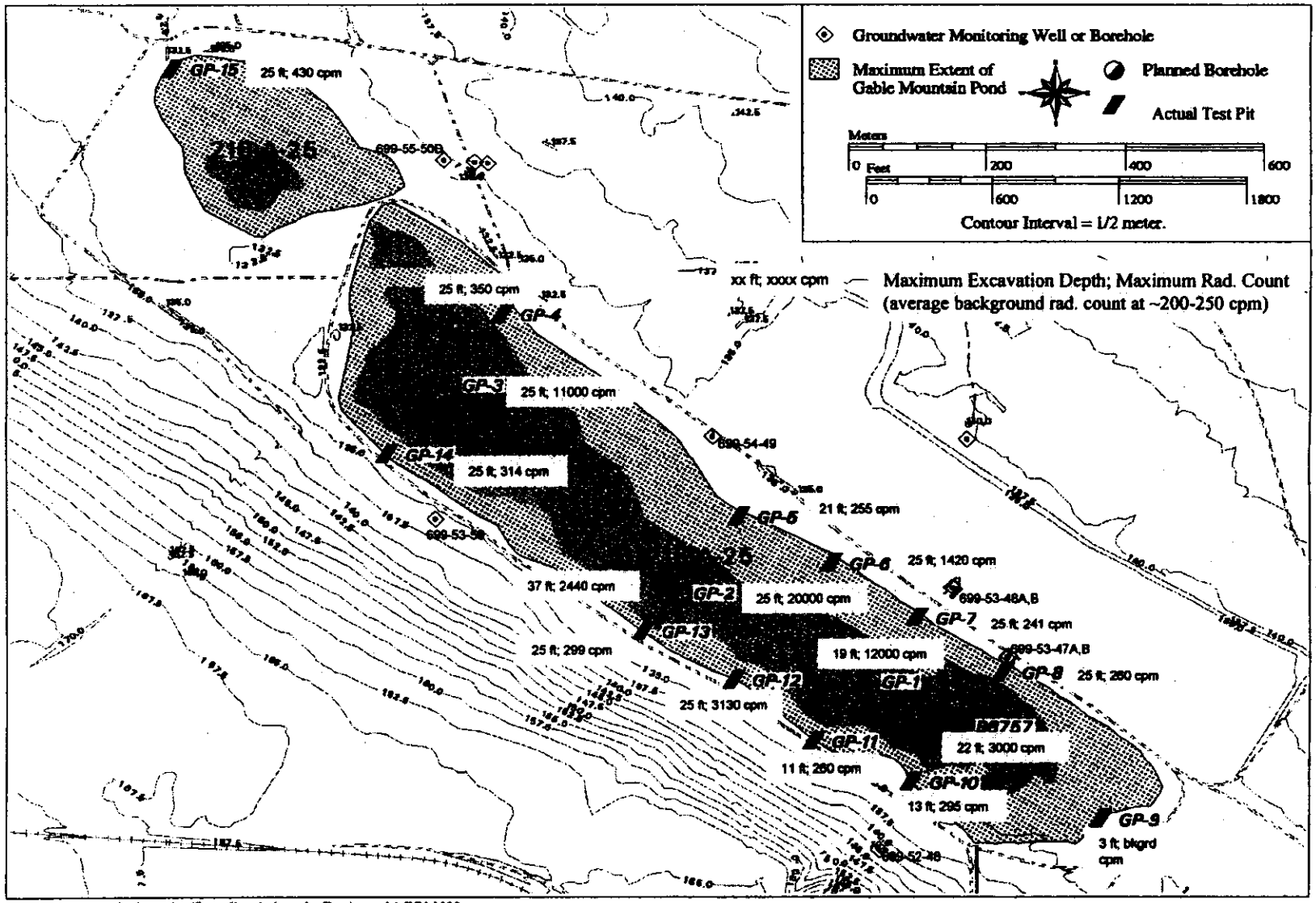
12/08/1999

Attachment 4

200-CW-1 Gable Mountain Pond RI Test Pit Summary



BH:rpp 11/04/98 singleton_km/figure6borehole.aml Database: 14-JUN-1999

9/10/99

Attachment 4

200-CW-1 Field Effort Summary

Test Pit Number	Date	Total Depth ft, bgs	Samples Collected	Maximum Field Reading	
				cpm	Depth ft, bgs
GP-1	9/7/1999	18.5	6	12000	7.5 - 8.5
GP-2	8/25/1999	25	8	20000	14.0 - 15.0
GP-3	8/19/1999	25	6	11000	9.5 - 10.5
GP-4	8/18/1999	25	7	400	7.0 - 8.0
GP-5	8/30/1999	21	7	255	3.0 - 4.0
GP-6	8/31/1999	25	7	1420	6.0 - 7.0
GP-7	9/10/1999	25	7	241	9.0 - 10.0
GP-8	8/27/1999	25	7	260	14.0 - 15.0
GP-9	9/8/1999	3	1	N/A	N/A
GP-10	9/8/1999	13	4	295	3.5 - 4.5
GP-11	9/2/1999	11	4	260	10.0 - 11.0
GP-12	9/1/1999	25	9	313	7.0 - 8.0
GP-13	8/23/1999	25	7	299	11.0 - 12.0
GP-14	8/23/1999	25	9	314	3
GP-15	8/16/1999	25	8	430	5.5 - 6.5
GP-16 (B8757)	9/9/1999	22	6	3000	10.5 - 11.5
BP-1	10/6/1999	25	6	3400	8
BP-2	10/12/1999	25	6	570	20
BP-3	10/5/1999	25	6	823	24 - 25
BP-4	10/7/1999	25	7	530	20 - 21
BP-5	10/12/1999	25	7	422	17 - 18
BP-6	10/14/1999	25	7	347	6 - 7
BP-7	10/20/1999	9	2	1331	6 - 7
BP-7A	10/28/1999	25	4	246	9 - 10
BP-8	10/19/1999	25	7	388	6 - 7
BP-9	10/28/99	25	7	242	7 - 8
TP-1	10/21/1999	25	7	66000	8 - 9
TP-2	10/25/1999	25	4	215	14 - 15
TP-3	10/26/1999	15	3	196	4 - 5
Borehole Number					
B8758	9/14/1999	16	4	560	14 - 16
(B Pond)	9/15/1999	36	4	870	23 - 25
	9/16/1999	75	1	307	44 - 45
	9/17/1999	134	1	382	124 -125
	9/20/1999	166	2	283	150 - 152
	9/21/1999	177	0	274	177
	9/22/1999	183.5	1		
B8757	12/1/1999	23	0	2440	14 - 15
(Gable Mtn. Pond)	12/2/1999	28.5	1	800	25 - 27.5
	12/3/1999	34	1	360	29 - 30.5
	12/6/1999	37	1	203	37

200-BP-1 Prototype Hanford Barrier FY 2000 Scope

Stability Monitoring

- Annual civil survey of creep gauges, surface topography markers, settlement markers
- Installation 3 new creep gauges SE corner with quarterly civil surveys

Vegetation Monitoring

- Annual vegetation survey of % cover, plant variability/species changes, shrub height and survivorship

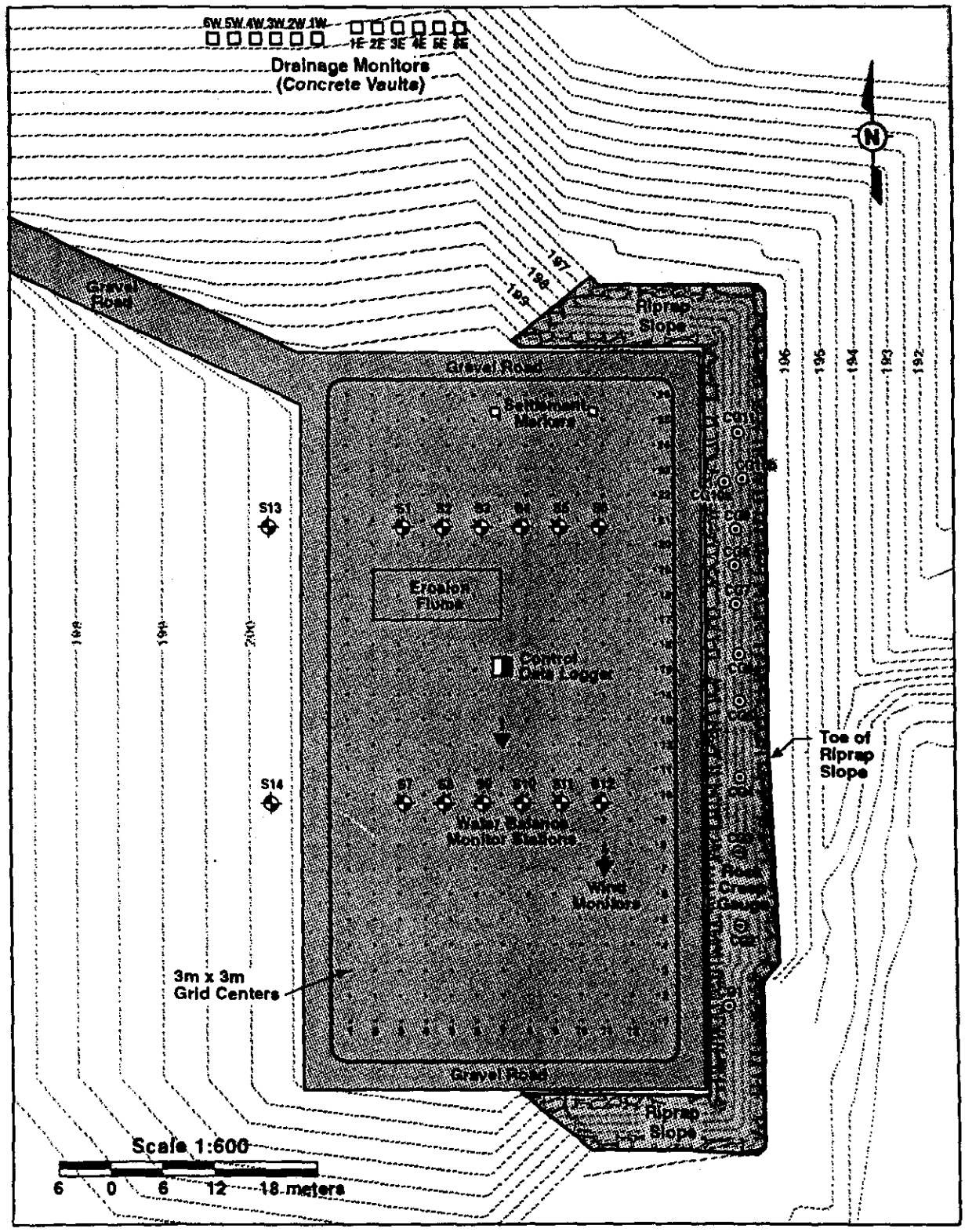
Animal Intrusion Monitoring

- Annual animal survey of animal use, and burrowing activity

Moisture Drainage Monitoring

- Silt loam water content measurement using automated time domain reflectometry (TDR)
- Precipitation automated measurements
- Above asphalt automated drainage measurements via siphon vault
- Below asphalt drainage measurements via lysimeter and neutron logging
- Upgrade automated data collection system

Year-End Annual Letter Report


6W 5W 4W 3W 2W 1W
1E 2E 3E 4E 5E 6E
Drainage Monitors
(Concrete Vaults)
Gravel Road
Riprap Slope
Gravel Road
Settlement Markers
S13
S1 S2 S3 S4 S5 S6
Erosion Flume
Control Data Logger
S14
S7 S8 S9 S10 S11 S12
Water Balance Monitor Stations
Wind Monitors
3m x 3m Grid Centers
Toe of Riprap Slope
Gravel Road
Riprap Slope
Scale 1:600
6 0 6 12 18 meters
N
197
198
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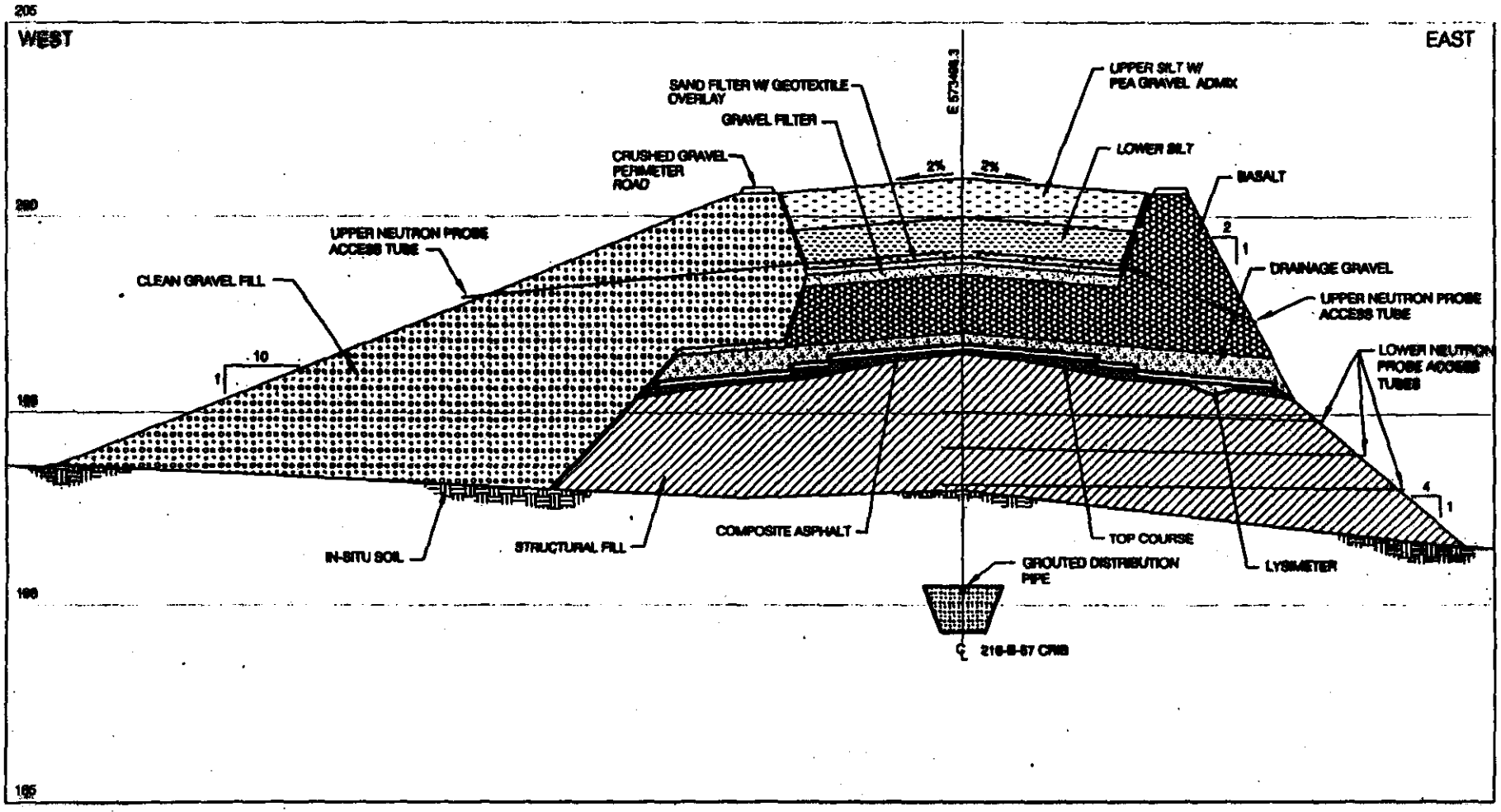
192

E9905023.3c

Hanford Prototype Barrier Cross-Section

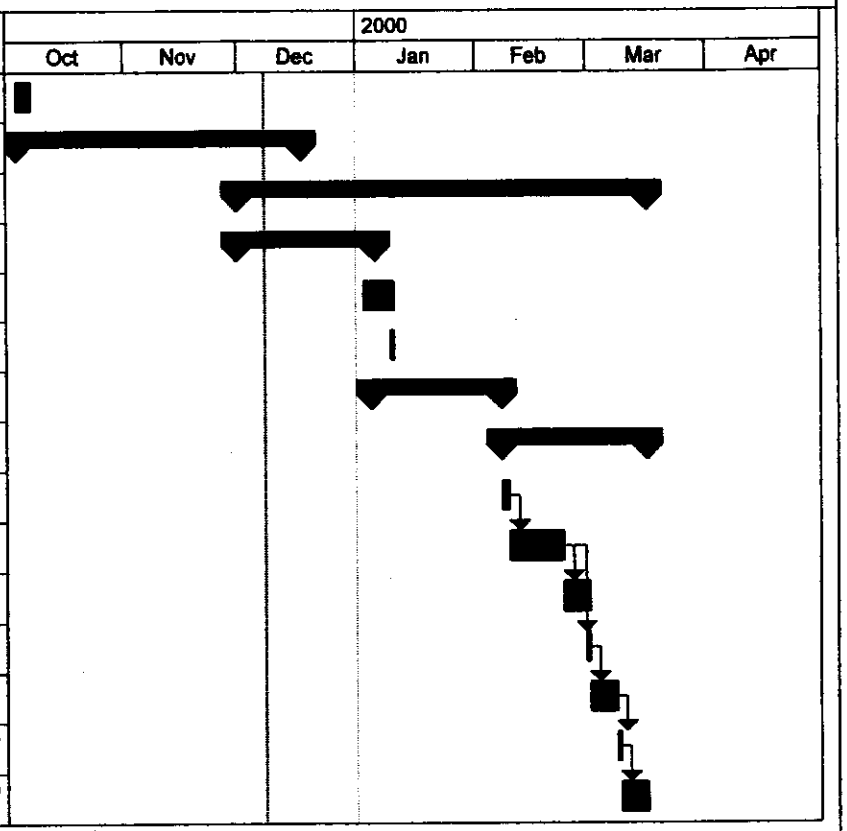


VERTICAL EXAGGERATION: 4X

Attachment 5

200-TW-1 & 200-TW-2 DQO Schedule
Preliminary

ID	Task Name	Duration	Start	Finish
1	Prepare Project Plan	4 days	Mon 10/4/99	Thu 10/7/99
2	**Draft Sections 2 & 3**	**55 days**	**Mon 10/4/99**	**Fri 12/17/99**
15	**Complete Waste Group DQOs**	**77 days**	**Wed 12/1/99**	**Thu 3/16/00**
16	**Project scoping**	**26 days**	**Wed 12/1/99**	**Wed 1/5/00**
22	Decision Maker Interviews	6 days	Mon 1/3/00	Mon 1/10/00
23	Global Issues Meeting (if needed)	1 day	Mon 1/10/00	Mon 1/10/00
24	**Prepare strawman**	**24 days**	**Wed 1/5/00**	**Mon 2/7/00**
32	**Prepare DQO Summary Report**	**28 days**	**Tue 2/8/00**	**Thu 3/16/00**
33	Internal DQO w/ strawman	2 days	Tue 2/8/00	Wed 2/9/00
34	Internal review draft to BHI	10 days	Thu 2/10/00	Wed 2/23/00
35	Revise draft summary report	5 days	Thu 2/24/00	Wed 3/1/00
36	RL briefing/draft summary report	1 day	Wed 3/1/00	Wed 3/1/00
37	Revise draft summary report/RL	5 days	Thu 3/2/00	Wed 3/8/00
38	External DQO meeting	1 day	Thu 3/9/00	Thu 3/9/00
39	Prepare Rev. 0 DSR	5 days	Fri 3/10/00	Thu 3/16/00

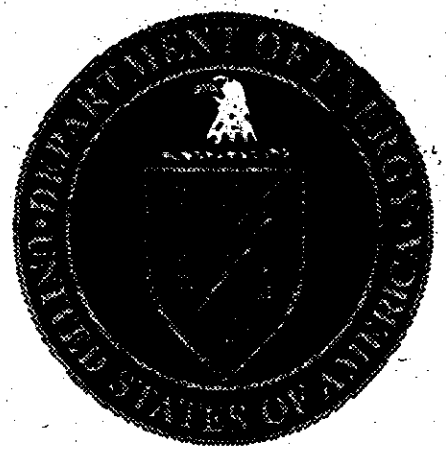


Project: detailschedule
Date: Wed 12/8/99

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary

Attachment 6

Project W-519 Infrastructure Support



DG Murillo

Project Manager

Attachment 7

- **Project Scope**
  - Provide the infrastructure to support the RPP privatization effort.
  - Electricity: Const. 7 MW and Ops 62 MW
  - Raw Water, 760 lpm
  - Potable Water, 200 lpm
  - Clearing and Grubbing Roads
  - Non-Rad, Non-Dangerous Effluent, accept 300,000 m^3/yr
  - Rad, Dangerous Effluent, accept 100,000 m^3/yr

Attachment 7

Legend

- Blue-Transfer Feed Corridors
- Pink-Contamination Zone
- Yellow-Privatization Parcel
- Red-New Roadway
- Green-New Substation
- Tan-Spoil Area

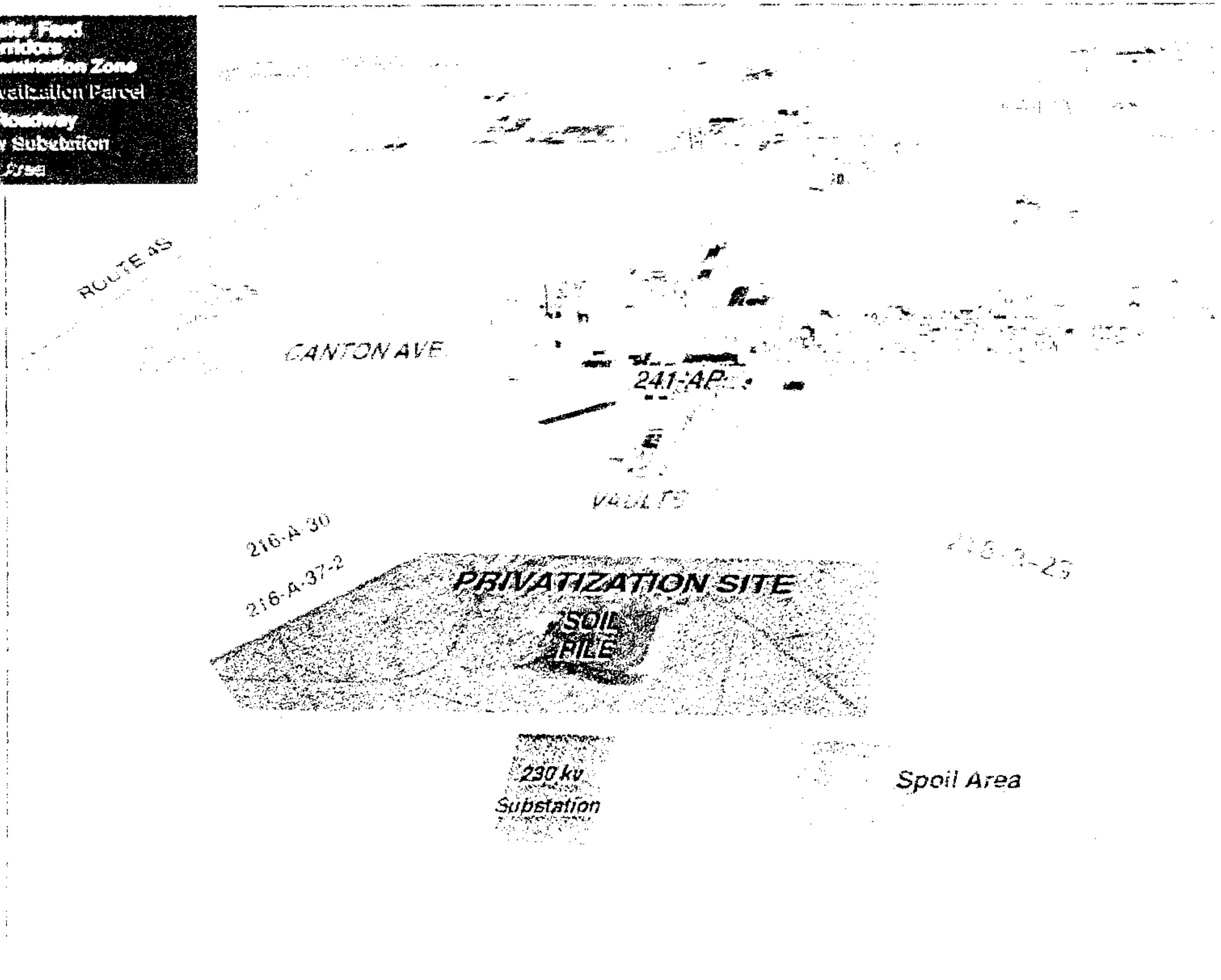


FIGURE 4. AERIAL PHOTOGRAPH OF THE PREFERRED S

Accomplishments

- Design
  - Completed 60% Detailed Design Review of the Electrical System.
  - Received 90% Design Package of Transmission Line for review.
- Construction
  - Began Site Clearing and Grubbing activities.
  - Began Spoil Pile Removal
  - Started road subgrade work on PC loop road.
  - Completed setup of construction office trailers.

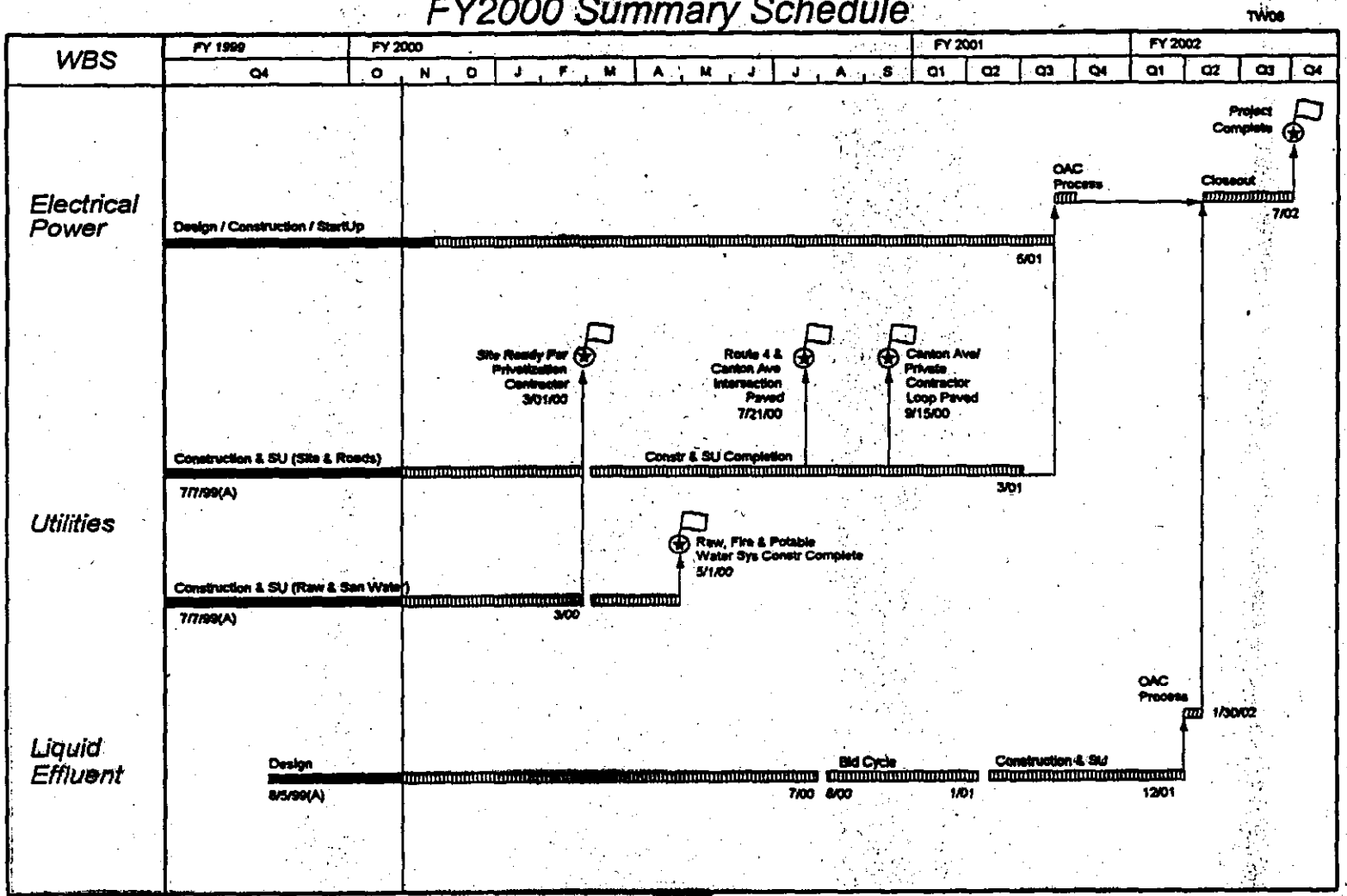
Attachment 7

90 Day Look Ahead

- Start installation of raw water line. (11/99).
- Issue for review 30% Design for Liquid Effluent Transfer System (11/99).
- Start Construction Electrical Utility mods (11/99).
- Complete installations of construction trailers (11/99)
- Complete 90% Design Review for Electrical System (11/99)
- Issue for Construction approved Detailed Design for Electrical System (12/99)

Attachment 7

W-519 Privatization Infrastructure
FY2000 Summary Schedule



Attachment 7

Pacific Northwest National Laboratory
Operated by Battelle for the
U.S. Department of Energy

December 13, 1999

Mr. Bruce Ford
Bechtel Hanford, Inc.
3350 George Washington Way
H0-21
Richland, WA 99352

Dear Mr. Ford:

I have included the information presented on 200 West Area Groundwater Contamination Update December 8, 1999 at the 200 Areas Unit Managers Meeting. The colored maps displaying contaminant distributions incorrectly indicated that they were for 1998, when in fact they were for 1997 data. This correction has been indicated in the titles of these figures.

If you wish to review 1998 data, please consult the report, *Hanford Site Groundwater Monitoring for Fiscal Year 1998*, which was sent to your office early this year. This report can also be accessed via the Internet at http://hanford.pnl.gov/groundwater/gwrep98/start.htm and we have copies of the report on CD.

Please let me know if you have questions on the presentation materials or other groundwater monitoring issues. You can also reach Evan Dresel at 376-8341.

Sincerely,

Stuart P. Luttrell
Project Manager
Hanford Groundwater Project

902 Battelle Boulevard • P.O. Box 999 • Richland, WA 99352

Telephone 509-376-6023 ■ e-mail: stuart.luttrell@pnl.gov ■ Fax 509-372-1704

200-West Area Groundwater Contamination Update

P. Evan Dresel
Environmental Technology Division
Pacific Northwest National Lab

December 8, 1999

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History

- T Plant was one of the 2 original bismuth phosphate processing plants (1944-1953)
- REDOX Plant replaced the bismuth phosphate process (1951-1967)
- Plutonium Finishing Plant (formerly Z Plant) used for final stages of purification (1949-1987)
- U Plant used for uranium recovery (1952-1958)

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Monitoring System Within 200-West Area Fenceline

- 34 wells sampled for CERCLA remediation
- 50 wells sampled for SSTs
- 28 wells sampled for LLBGs (LLWMA-3; LLWMA-4)
- 5 wells sampled for S-10 pond & ditch
- 2 wells sampled for U-12 crib
- 99 wells sampled for plume monitoring (including cosamples)

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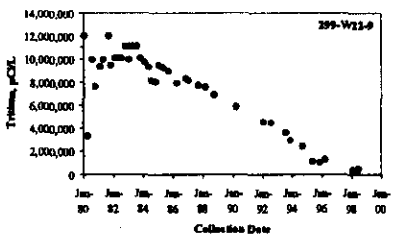
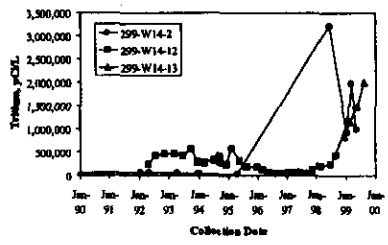
Tritium and Iodine-129

- Plume tracking being impacted by wells going dry
- **Large** increase in tritium and I-129 seen in wells east of WMA-TY, near the 216-T-28 crib





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Uranium and Technetium-99

- Increasing uranium in a number of wells in 200-UP-1 pump and treat vicinity
- Tc-99 shows increasing trends in several wells around 200-UP-1 pump and treat - contaminants from upgradient
- Tc-99 continues to show high spatial and temporal variability near SSTs
- Tc-99 in groundwater at SX-115 borehole ~34,000 pCi/L -- highest on site
- High uncertainty in rate and extent of movement downgradient of WMA S-SX because of sparse well coverage

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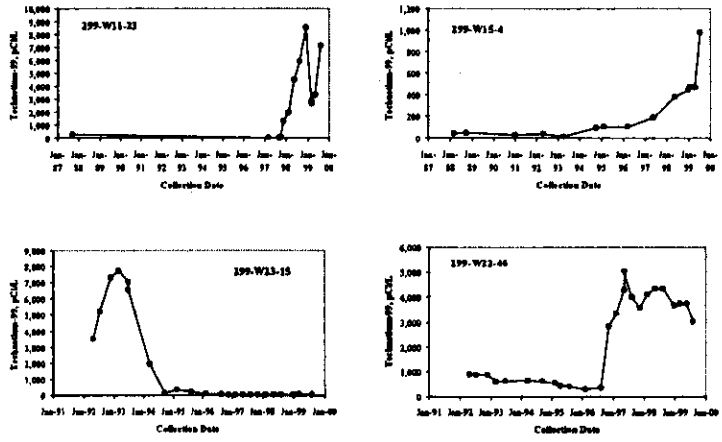
Tc-99 Trends in 200-West Area



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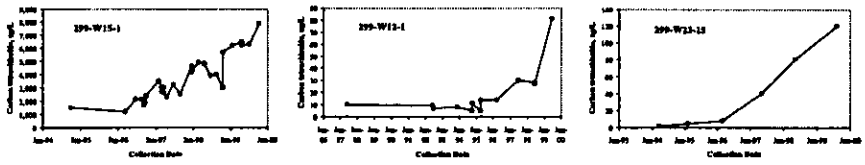
Carbon Tetrachloride

- Concentrations rising in area of pump and treat remediation
- Rapid rise in the northeast corner of the Area
- Rising concentrations near WMA-S-SX – previous low concentration zone



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Nitrate

- Nitrate shows multiple sources in 200-West
- More extensive contamination than tritium
- Increasing trends near WMA-T
- Some increase near WMA-S-SX but not all related to tank farm

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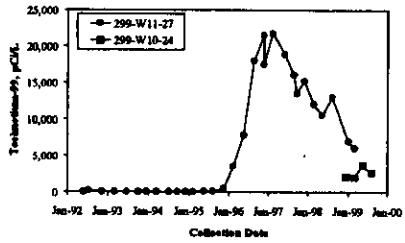
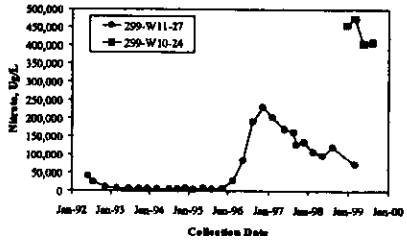
Nitrate, Cont.

- Nitrate and technetium-99 relationships are very different for new well 299-W10-24 north of WMA-T from old well 299-W11-27





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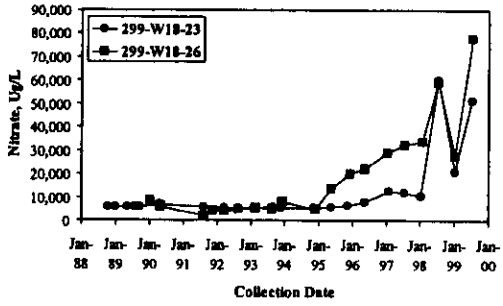
Nitrate, Cont.

- Increasing trends in western part of area near 200-ZP-1 pump and treat injection



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Vertical Extent of Contamination

- Carbon tetrachloride has been detected in deeper parts of the unconfined aquifer including sediments below the Ringold lower mud
- Interpretation is difficult due to the different sampling techniques (well nests,samples collected during drilling, packer samples, Kabis samples) and data coverage
- Wells at periphery of plume may show slightly higher concentrations at depth than at the water table

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Issues

- 3-dimensional data on extent of contamination -- what are the needs?
- Issue of actinides by Z-9 crib
- No monitoring wells immediately downgradient of the T-14 to T-17 trenches
- Lack of spatial coverage in eastern/northeastern part of area
- Coverage downgradient of WMA-S-SX
- Wells going dry

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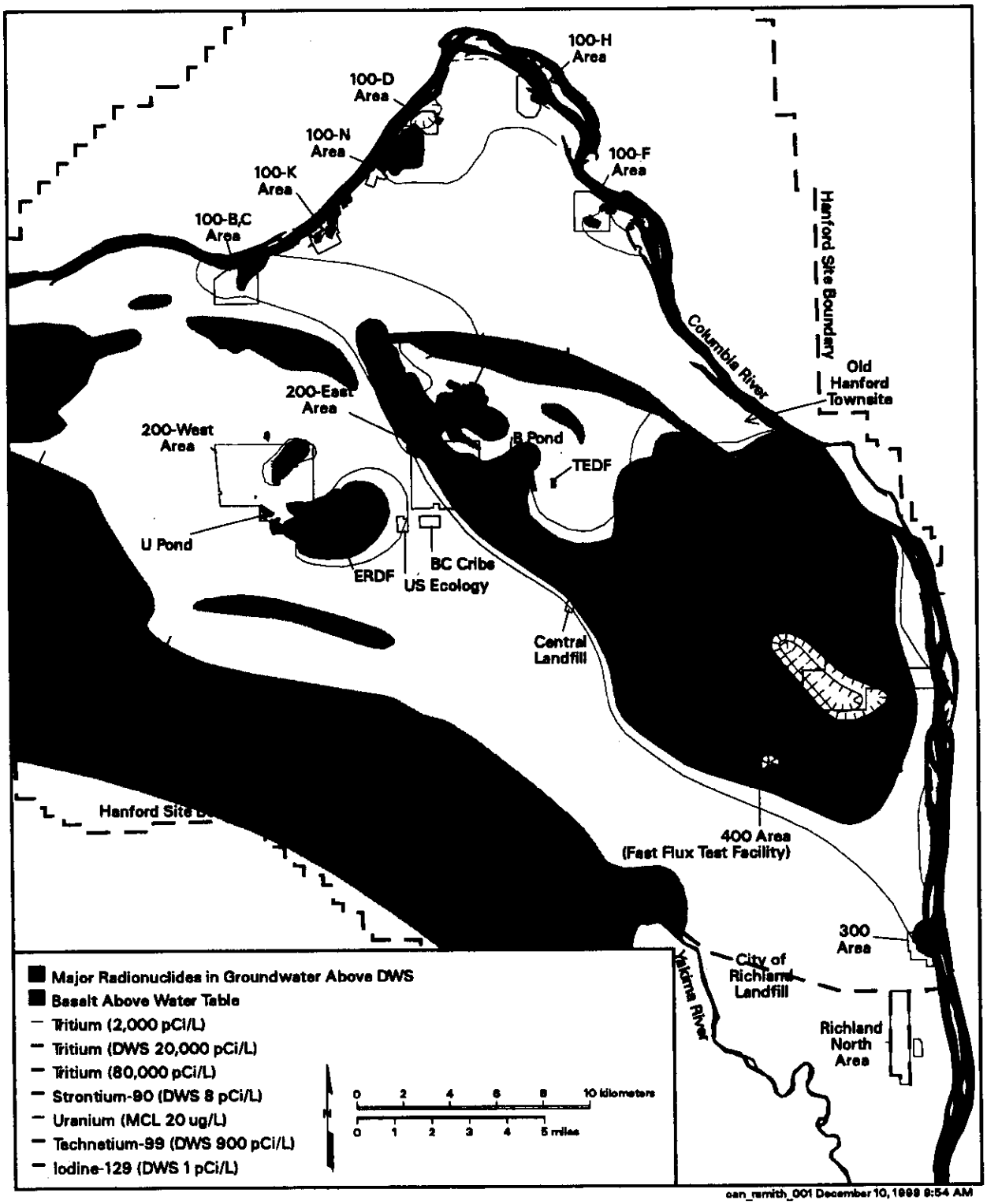
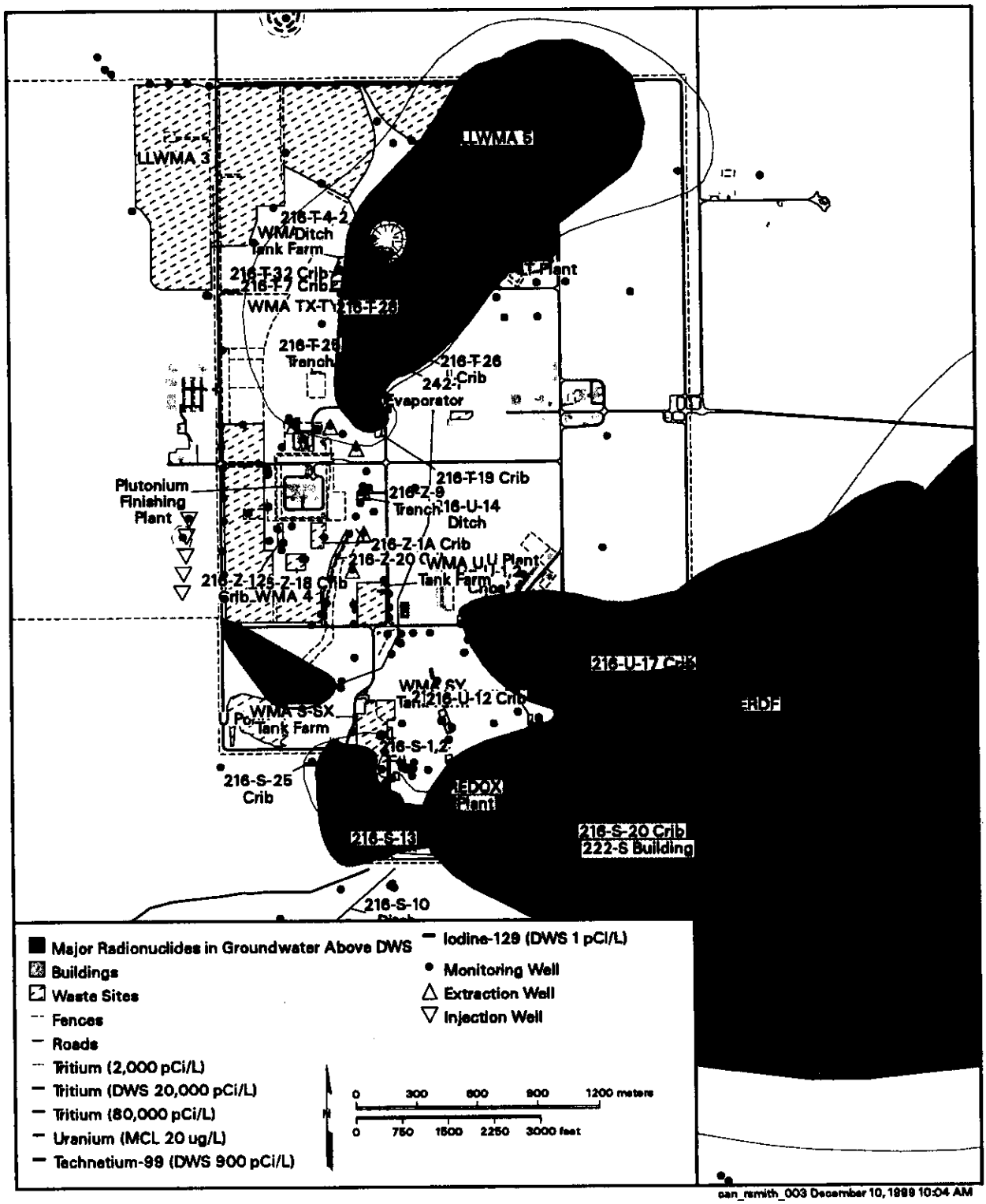
Extent of Radionuclide Contamination Above DWS (1997)

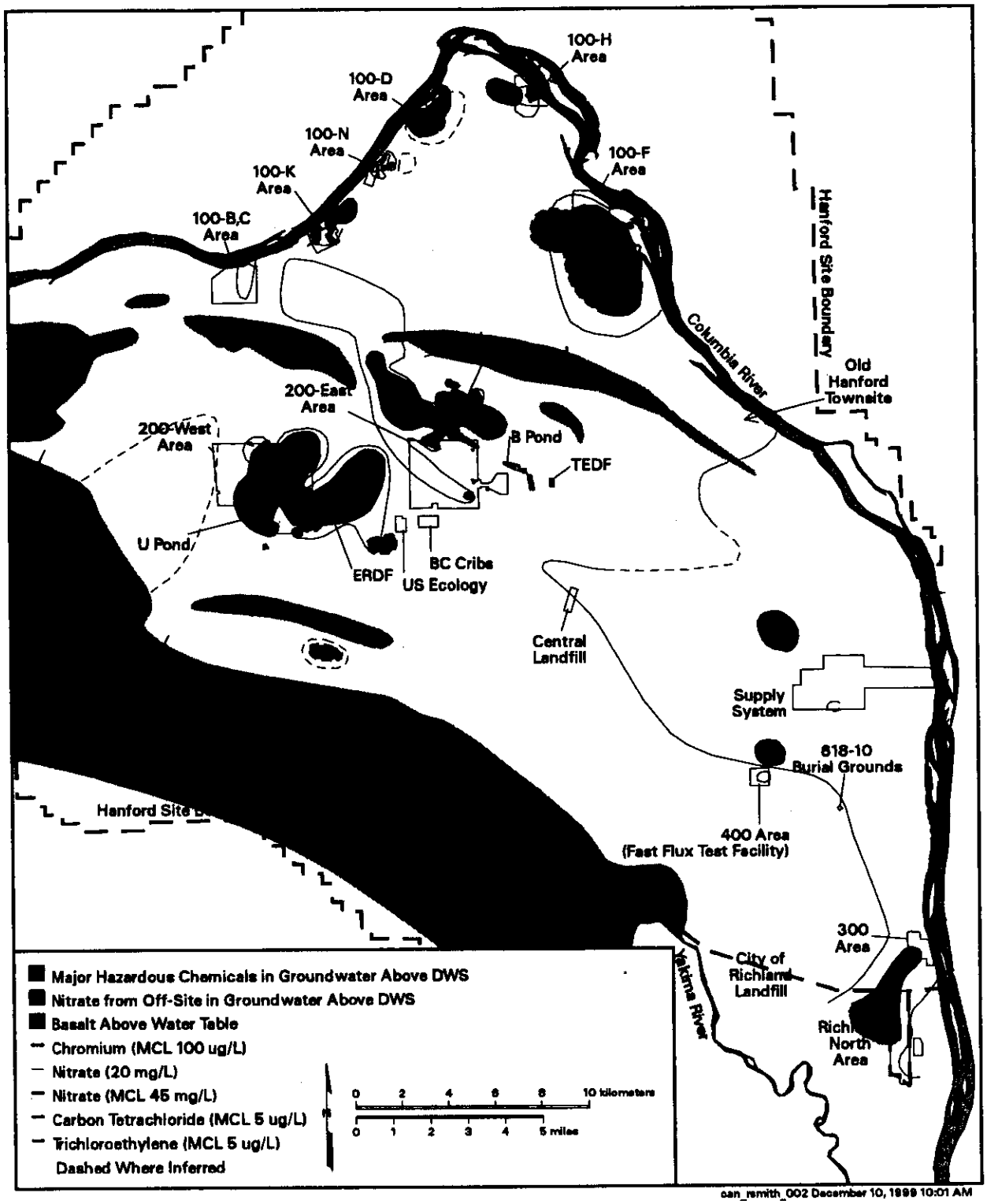


can_remith_001 December 10, 1998 9:54 AM

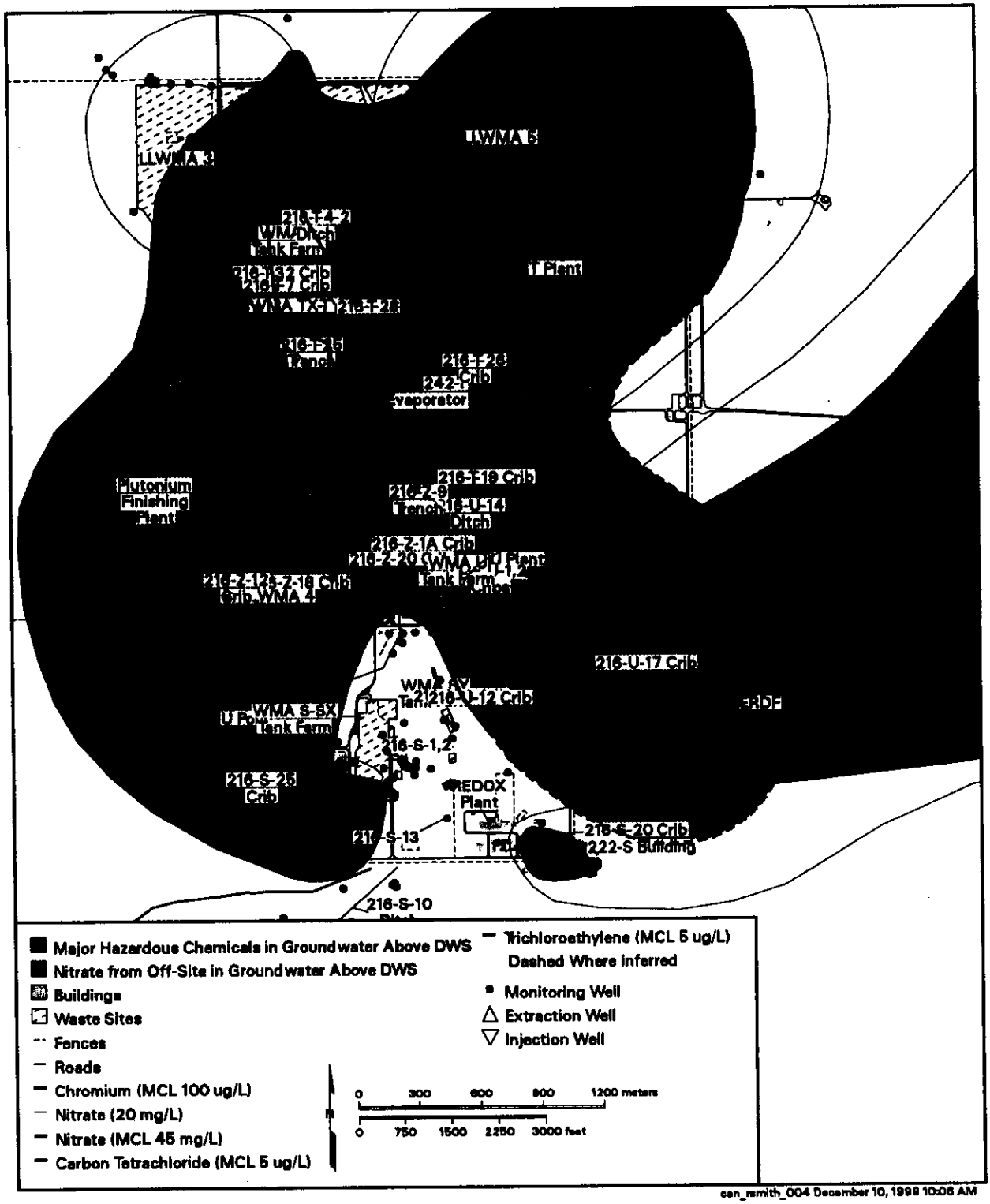
Extent of Radionuclides Above DWS, 200 West (1997)



Extent of Major Hazardous Chemicals Above DWS (1997)

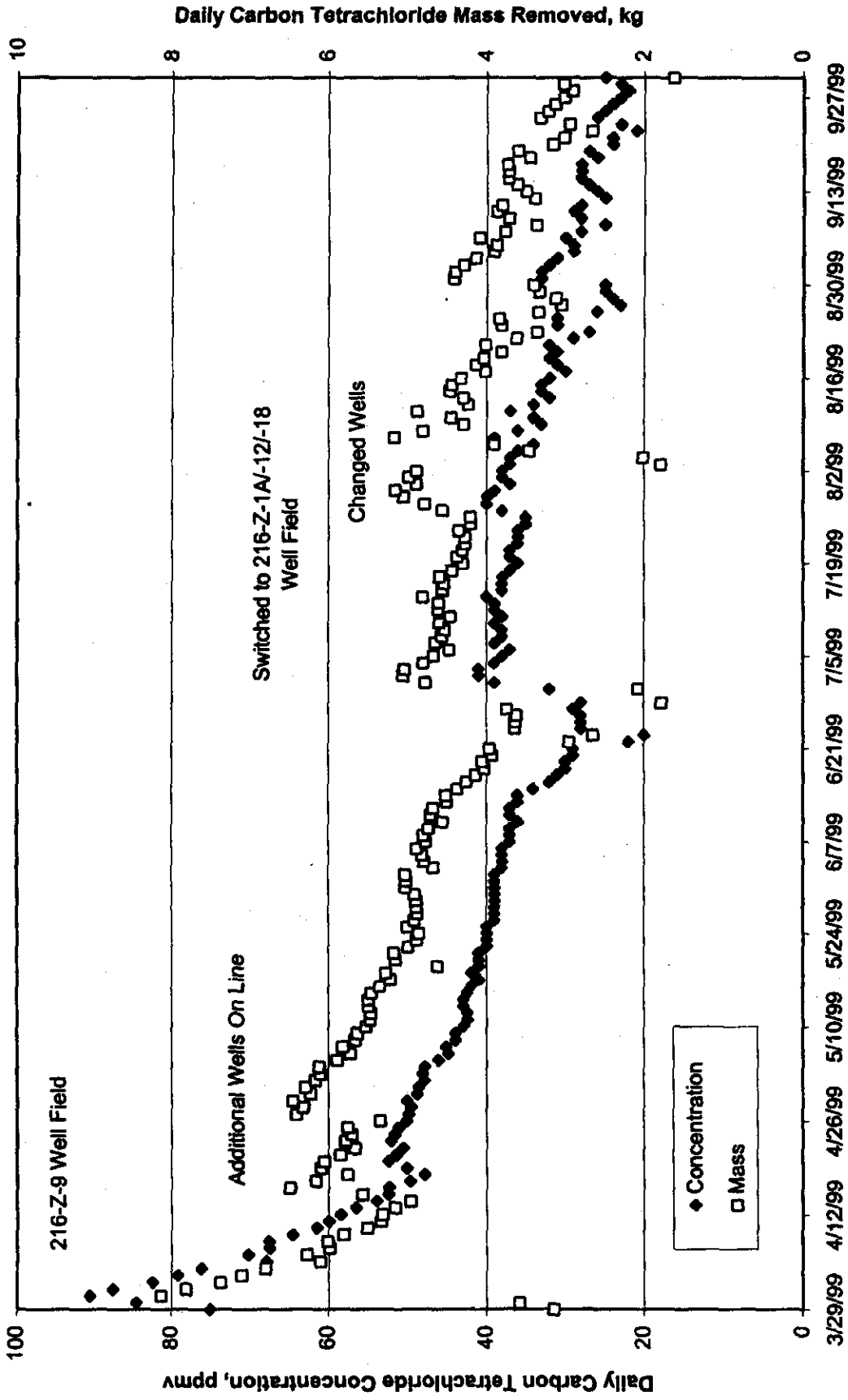


Extent of Major Hazardous Chemicals Above DWS, 200 West (1997)

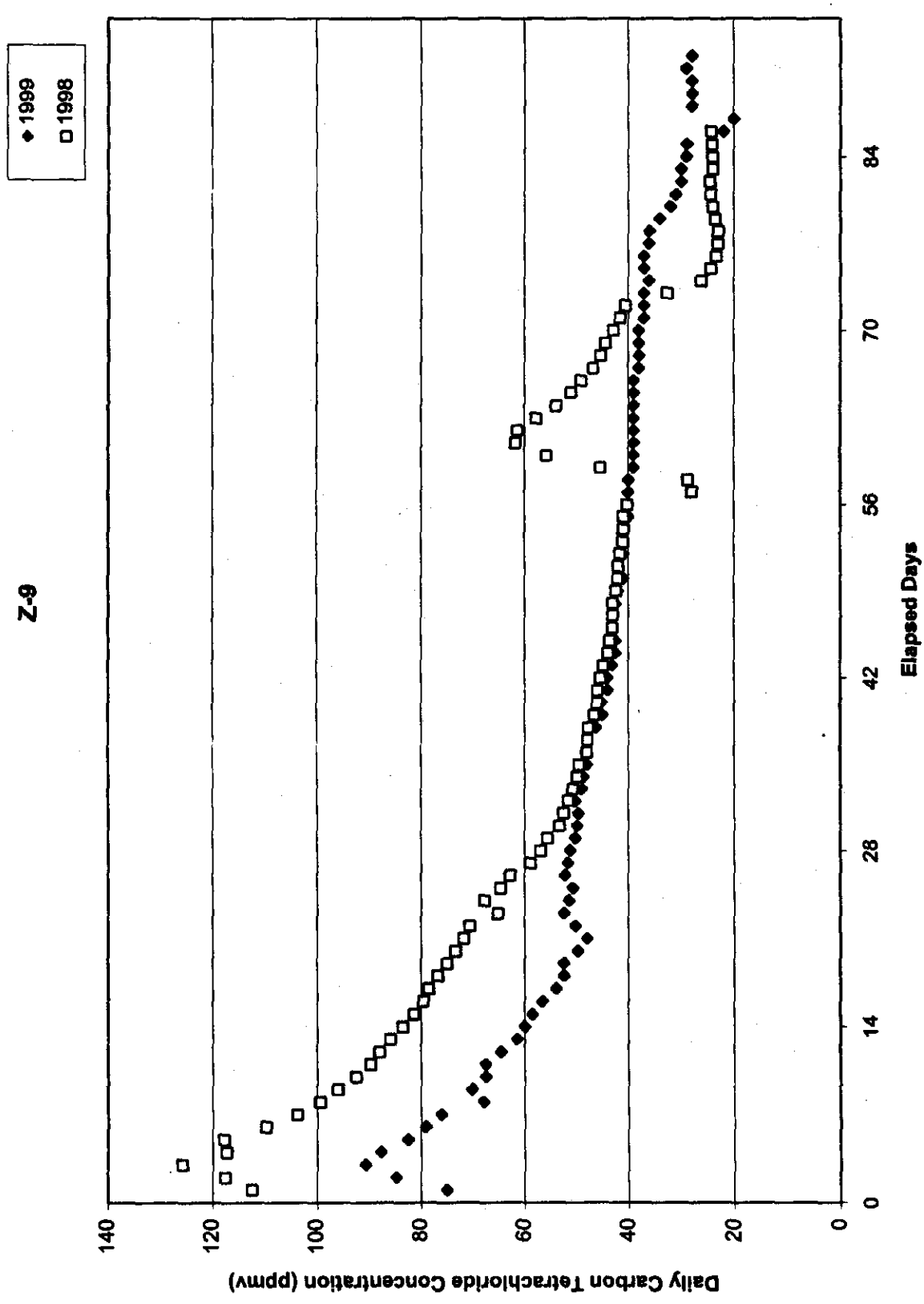


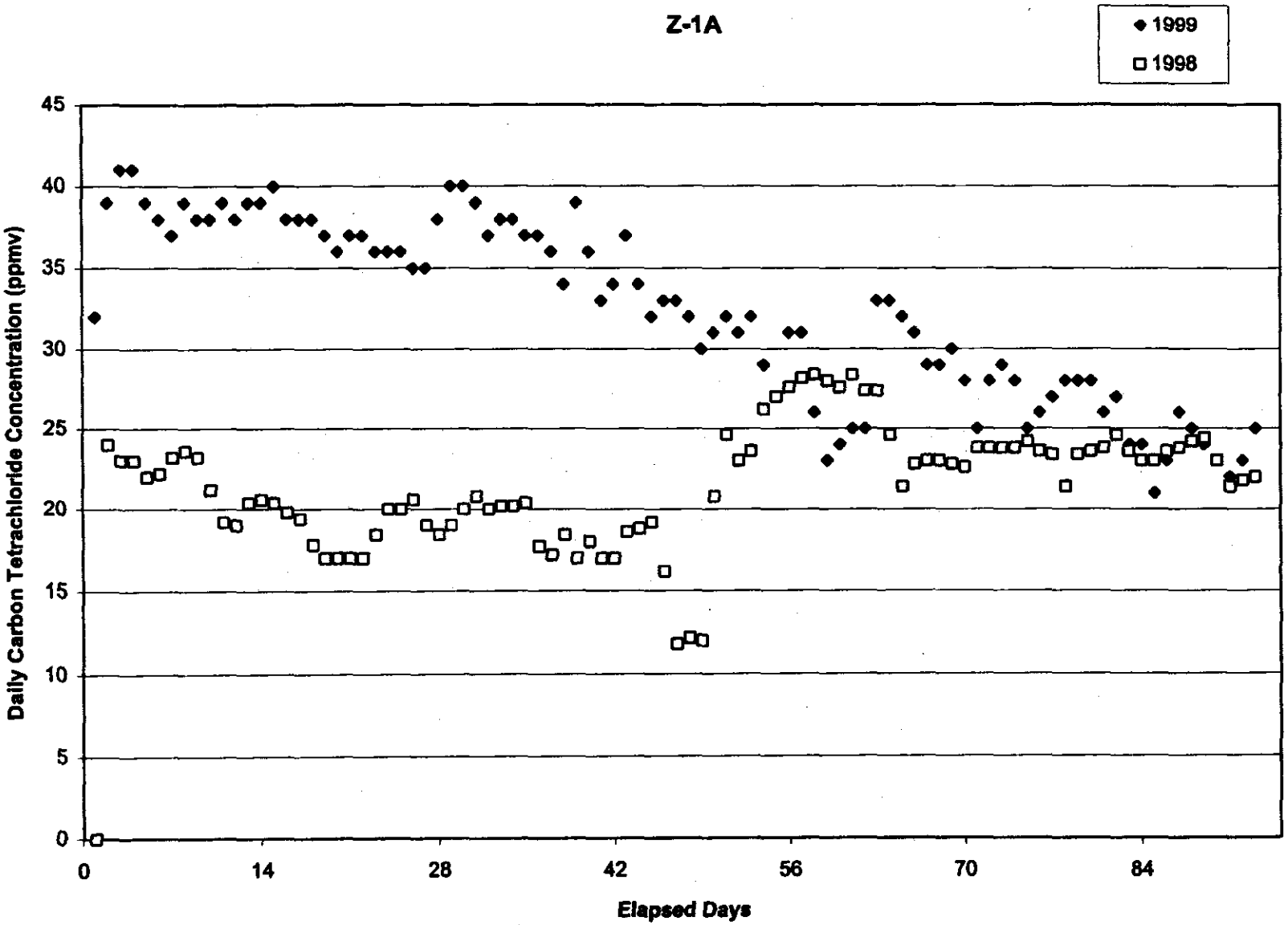
can_nmith_004 December 10, 1998 10:06 AM

Attachment 9



H5


Z-9
1999
1998
Daily Carbon Tetrachloride Concentration (ppmv)
0
20
40
60
80
100
120
140
Elapsed Days
0
14
28
42
56
70
84



Attachment 8

Carbon Tetrachloride Removed

	FY1999		FY1998	
	kg	days	kg	days
Z-9	447	92	523	86
Z-1A	385	93	254	93
Total	832	185	777	179

Comparison of Maximum Carbon Tetrachloride Rebound Concentrations Monitored at 200-ZP-2 Soil Vapor Extraction Sites FY 1997 - FY 1999

200-ZP-2 Location (Well or Probe) /feet bgs	Site	Zone	November 1996 - July 1997 Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	October 1997 - September 1998 Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	July 1998 - September 1999 Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound
79-03/ 5 ft	Z-18	1	0	8	0	3	0	12
79-06/ 5 ft	Z-1A	1	not measured		not measured		1.4	12
79-11/ 5 ft	Z-1A	1	0	8	0	6	2.9	12
86-05/ 5 ft	Z-9	1	not measured		not measured		0	3
86-05-01/ 5 ft	Z-9	1	not measured		not measured		0	3
86-06/ 5 ft	Z-9	1	1.3	8	0	9	1.9	6
87-05/ 5 ft	Z-1A	1	not measured		0	3	1.0	12
87-09/ 5 ft	Z-1A	1	not measured		1.5	3	2.6	12
94-02/ 5 ft	Z-9	1	0	8	not measured		1.4	3
95-11/ 5 ft	Z-9	1	0	8	2.1	9	2.5	6
95-12/ 5 ft	Z-9	1	1.1	8	1.5	9	1.3	6
95-14/ 5 ft	Z-9	1	not measured		not measured		0	3
CPT-13A/ 9 ft	Z-1A	2	not measured		0	6	1.0	12
CPT-16/ 10 ft	Z-9	2	not measured		0	9	1.5	6
CPT-17/ 10 ft	Z-9	2	not measured		4.2	9	5.1	6
CPT-18/ 15 ft	Z-9	2	not measured		6.5	9	5.0	6
CPT-31/25 ft	Z-1A	2	not measured		0	6	0	12
CPT-32/ 25 ft	Z-1A	2	not measured		9.1	6	10	12
CPT-30/ 28 ft	Z-18	2	not measured		not measured		3.2	12
CPT-7A/ 32 ft	Z-1A	2	not measured		2.3	6	5.4	12
CPT-1A/ 35 ft	Z-18	2	2.0	8	1.4	3	3.0	12
CPT-33/ 40 ft	Z-1A	2	not measured		2.0	3	2.6	12
CPT-34/ 40 ft	Z-18	2	2.3	8	not measured		1.7	12
CPT-21A/ 45 ft	Z-9	2	65.6	8	52.7	9	57	3
W15-220ST/ 52 ft	Z-9	2	2	8	not measured		1.6	3
CPT-28/ 60 ft	Z-9	2	not measured		1.5	0	3.7	3
CPT-9A/ 60 ft	Z-9	2	45.5	8	41.1	0	44	3
CPT-30/ 68 ft	Z-18	2	1.7	8	not measured		3.0	12
CPT-13A/ 70 ft	Z-1A	2	5.2	8	not measured		5.6	12
CPT-24/70 ft	Z-9	2	not measured		3.2	9	3.6	3
W15-219SST/ 70 ft	Z-9	2	14.6	8	not measured		7.6	3
CPT-31/ 76 ft	Z-1A	2	4.0	8	not measured		4.2	12
CPT-33/ 80 ft	Z-1A	2	5.8	8	not measured		9.2	12
W15-82/ 82 ft	Z-9	2	28.9	8	5.5	9	46	6
W15-95/ 82 ft	Z-9	2	not measured		15.3	9	39	6
CPT-21A/ 86 ft	Z-9	2	221	8	206	9	148	6
CPT-34/ 86 ft	Z-18	2	36.3	8	5.9	3	0	12
W15-218SST/ 86 ft	Z-9	2	not measured		not measured		0.0	3
CPT-28/ 87 ft	Z-9	2	280	8	230	9	203	6
CPT-1A/ 91 ft	Z-18	2	3.9	8	not measured		4.2	12
CPT-4A/ 91 ft	Z-1A	2	not measured		7.7	3	14	12
CPT-9A/ 91 ft	Z-9	2	103	8	34.5	9	72	3
W18-252SST/ 100 ft	Z-1A	2	38.2	8	17.8	3	24	12
W18-152/ 113 ft	Z-12	2	46.8	8	11.1	3	33	12
W15-217/ 115 ft	Z-9	3	797	8	630	9	561	6
CPT-24/ 118 ft	Z-9	3	44.6	8	37.7	9	37	6
W15-220SST/ 118 ft	Z-9	4	21.9	8	not measured		36	3
W18-158L/ 123 ft	Z-1A	3	not measured		143	3	492	12
W18-167/ 123 ft	Z-1A	3	323	8	79.7	3	228	12
W15-219SST/ 130 ft	Z-9	4	298	8	not measured		47	3
W18-249/ 134 ft	Z-18	3	206	8	20.4	3	215	12
W18-248/ 136 ft	Z-1A	3	288	8	86.3	3	177	12
W15-219SST/ 155 ft	Z-9	5	59.6	8	not measured		24	3
W15-220SST/ 185 ft	Z-9	5	14.5	8	not measured		13	3
W15-6L/ 189 ft	Z-9	6	22.6	8	17.6	9	1.3	6
W15-9L/ 189 ft	Z-9	6	18.3	8	15.0	9	15	6
W18-7/ 200 ft	Z-1A	6	28.5	8	17.3	3	29	12
W18-6L/ 206 ft	Z-1A	6	36	8	31.3	6	15	12
W18-12/ 210 ft	Z-18	6	not measured		3.8	3	19	12

* - based on location (Z-1A/18/12 or Z-9) of monitoring point; specific points may be beyond SVE zone of influence during particular operating configurations
- Z-18 and Z-12 wells off-line Oct 96 - Apr 98
- CPT-1A, CPT-9A, and possibly CPT-7A appeared to be beyond SVE zone of influence in Oct 96 based on differential pressure (BHI-01105, p. 6-1)
- CPT-9A, CPT-21A, CPT-28 beyond SVE zone of influence in May 96 based on CCl4 concentrations and airflow modeling based on measured vacuums (BHI-01105, p. 6-1)

Carbon Tetrachloride Rebound Concentrations
Monitored at 200-ZP-2 Soil Vapor Extraction Sites
July 1998 - September 1999

200-ZP-2 Location (Well or Probe) /feet bgs	Zone	6/14/98 (a) CCl4 (ppmv)	9/29/98 CCl4 (ppmv)	11/5/98 CCl4 (ppmv)	12/1/98 CCl4 (ppmv)	12/31/98 CCl4 (ppmv)	1/26/99 CCl4 (ppmv)	2/23/99 CCl4 (ppmv)	3/22/99 3/23/99 CCl4 (ppmv)	4/26/99 CCl4 (ppmv)	5/25/99 CCl4 (ppmv)	6/28/99 CCl4 (ppmv)	07/30/99 CCl4 (ppmv)	09/14/99 CCl4 (ppmv)	9/28/99 CCl4 (ppmv)
79-03/ 5 ft	1									0	0	0			
79-06/ 5 ft	1			0	0	0	0	1.2	0	0	1.4	1.2			
79-11/ 5 ft	1	0	0	2.8	0	2.9	1.9	1.6	2.5	1.5	1.4	0			
86-05/ 5 ft	1												— (m)		0
86-05-01/ 5 ft	1													— (p)	
86-06/ 5 ft	1			— (b)	0	0	0	1.5	1.9				— (n)	0	0
87-05/ 5 ft	1									1.0	1.0	0			
87-06/ 5 ft	1	0	1.5	0	0	1.1	0	0	1.2	2.6	2.4	2.3			
94-02/ 5 ft	1												1.4	0	0
95-11/ 5 ft	1			0	0	1.5	2.5	— (f)	— (g)						
95-12/ 5 ft	1			1.2	0	1.2	1.3	1.2	— (g)						
95-14/ 5 ft	1												— (n)	— (p)	
CPT-13A/ 9 ft	2									0	1.0	0			
CPT-16/ 10 ft	2			1.6	0	0	0	1.0	0				— (n)	0	0
CPT-17/ 10 ft	2			3.2	1.7	3.2	3.7	3.4	5.1				2.1	2.6	2.3
CPT-18/ 15 ft	2			0	0	5.0	4.5	4.6	3.3				1.3	3.5	0
CPT-31/25 ft	2									0	0	0			
CPT-32/ 25 ft	2	0	0	1.0	2.1	5.2	7.0	7.4	8.3	10.0	9.1	8.4			
CPT-30/ 28 ft	2			0	0	0	0	0	0	3.2	0	0			
CPT-7A/ 32 ft	2	1.4	1.7	1.7	2.4	2.6	5.4	3.5	3.5	3.2	3.7	2.6			
CPT-1A/ 35 ft	2									2.8	3.0	2.1			
CPT-33/ 40 ft	2									2.3	2.6	2.1			
CPT-34/ 40 ft	2									1.3	1.4	1.5	1.7	1.1	1.1
CPT-21A/ 45 ft	2												51.7	58.6	42
W15-220SST/ 52 ft (	2												— (n)	1.6	1.3
CPT-28/ 60 ft	2												3.7	2.1	1.6
CPT-8A/ 60 ft	2												— (n)	43.9	44.0
CPT-30/ 68 ft	2									3.0	1.6	1.7			
CPT-13A/ 70 ft	2									5.3	5.4	5.6			
CPT-24/ 70 ft	2												— (n)	3.6	2.3
W15-219SST/ 70 ft (	2												— (n)	7.6	2.8
CPT-31/76 ft	2									4.2	2.2	3.2			
CPT-33/ 80 ft	2									7.6	8.5	9.2			
W15-82/ 82 ft	2			46.4	19.2	23.1	22.1(e)	24.6	18.5				— (n)	42.5	38.1
W15-95/ 82 ft	2			39.4	25.4	37.3	28.1	30.6	27.1				— (n)	8.3	7.6
CPT-21A/ 86 ft	2			126	74.6	140	148	142	119	90.9	61.9	82.0	66.6	12.6	123
CPT-34/ 86 ft	2									0 (j)	— (k)	— (k)			
W15-218SST/ 86 ft	2												— (n)	— (q)	— (q)
CPT-28/ 87 ft	2			184	65.2	203	170	156	176	98.6	53.4	93.1	49.3	151	105
CPT-1A/ 91 ft	2									4.2	0	2.4	2.1	3.3	0
CPT-4A/ 91 ft	2									10.9	14.1	14.4			
CPT-8A/ 91 ft	2			39.0	38.6	12.4	39.8	32.2	37.7	37.5	32.0	14.2	— (n)	72.3	17.3
W15-252SST/ 100 ft	2	8.9	17.6	18.2	13.3	22.7	10.7	24.0	23.2						
W15-152/ 113 ft	2	11.1	0	27.9	3.4	25.2	31.7	33.3	3.3	4.7	4.4	2.0			
W15-217/ 115 ft	3			— (c)	26.8	339	348(e)	418	561				66.6	267	26.3
CPT-24/ 115 ft	3			37.1	37.3	33.5	20.9	21.3	25.6				— (n)	33.3	11.4
W15-220SST/ 118 ft	4												— (n)	35.9	17.1
W15-159L/ 123 ft	3	— (d)	143	172	172	— (d)	267	268	399	492	329	310			
W15-167/ 123 ft	3	— (d)	79.7	127	205	— (d)	228	216	195	211	219	173			
W15-219SST/ 130 ft	4												— (n)	46.5	— (q)
W15-249/ 134 ft	3	— (c)	20.4	215	23.3	208	188	139	76.9	81.1	77.1	90.9			
W15-248/ 136 ft	3	7.1	66.3	93.5	96.0	138	136	148	144	162	177	152			
W15-219SST/ 155 ft	5												— (n)	24.2	— (q)
W15-220SST/ 185 ft	5												— (n)	13.4	8.4
W15-6L/ 169 ft	6			— (c)	0	1.3	1.1	1.2	0 (h)						
W15-9L/ 189 ft	6			— (c)	14.8	14.9	14.1	14.9	— (c)				— (n)	10.3	1.1
W15-7/ 200 ft	6	0	17.3	22.5	21.8	26.7	26.4	28.4	29.0						
W15-6L/ 206 ft	6	4.3	14.5	— (c)	— (c)	— (c)	— (c)	— (c)	— (c)						
W15-12/ 210 ft	6	1.2	3.8	7.5	12.0	13.6	12.2	16.5	15.9						

(a) sampled 6/14/98; analyzed 6/15/98

(b) probe 86-07R destroyed; substitute probe 86-06 after 11/98

(c) not in service

(d) access to Z-1A unavailable (no key)

(e) opened for vertical velocity profiling 1/6/99-1/19/99

(f) probe 95-11 clogged; substitute probe 94-02 after 2/99

(g) probe 95-11 clogged, probe 94-02 could not be located; probe 95-12 destroyed

(h) W15-6L tubing discovered on 3/23 to be separated at first splice (~ 50 ft of tubing in well); time of separation unknown.

(j) sample very difficult to pull. Approximately 1/8 L purge and sample.

(k) unable to pull sample from CPT-34/86'; attempted to pull from 60' but unable.

(m) probe destroyed

(n) sample pump failure

(p) unable to locate

(q) unable to pull sample due to low flow

VADOSE ZONE MONITORING PLAN FOR 200-ZP-2 FOR FY 2000
OCTOBER 1999 THROUGH SEPTEMBER 2000

Non-Operational Monitoring and Passive Soil Vapor Extraction Monitoring

Scope: Monitor carbon tetrachloride soil vapor concentrations at selected probes and wells during the shutdown of the soil vapor extraction (SVE) system (Tables 1 and 2). All of the probes and some of the wells are "non-operational," i.e., they are not currently connected to a SVE system. Eight of the wells have a passive soil vapor extraction system installed at the wellhead.

Passive soil vapor extraction is a remediation technology that uses naturally-induced pressure gradients between the subsurface and the surface to drive soil vapor to the surface. In general, falling atmospheric pressure causes subsurface vapor to move to the atmosphere through wells, while rising atmospheric pressure causes atmospheric air to move into the subsurface. The passive soil vapor extraction systems will be used to remove carbon tetrachloride from the vadose zone.

All of the passive extraction wells will vent through above-ground canisters containing Granular Activated Carbon (GAC). Each system also has an in-line, replaceable cartridge of GAC for sampling upstream of the canister of GAC. The GAC cartridges will be sampled and analyzed periodically to provide a passive, time-integrated measure of the amount of mass removed through the well. Three of the passive systems are also instrumented to measure and record the flow and carbon tetrachloride vapor concentration on an hourly basis; these data can be used to calculate an hourly estimate of the amount of mass removed (Table 3).

For monitoring the non-operational probes and wells, the components of this scope are:

- Collect soil vapor samples using the rebound study sampling method and sampling pump (Rohay 1997)
- Analyze soil vapor samples for carbon tetrachloride using B&K at field screening level QC-1 (BHI-QA-03)
- Evaluate concentration trends for ERC
- Report results to 200-ZP-2 Unit Managers
- Include results in annual reports

For monitoring the 8 passive soil vapor extraction system wells, the components of this scope are:

- Changeout the used in-line GAC sample cartridges and replace with clean GAC sample cartridges
- Sample the GAC and send the GAC samples to an off-site laboratory for analysis of carbon tetrachloride (Sampling Authorization Form B99-093)
- Download the dataloggers (4) and B&K instruments (3)
- Evaluate concentration trends for ERC

- Report results to 200-ZP-2 Unit Managers
- Include results in annual reports

Purpose and Objectives: The purpose of non-operational monitoring is to measure carbon tetrachloride concentrations in the vadose zone during the shutdown of the SVE system.

The objectives of monitoring the non-operational wells and probes are (1) to be cognizant of carbon tetrachloride concentrations and trends near the vadose-atmosphere and vadose-groundwater interfaces to ensure that non-operation of the SVE system is not negatively impacting atmosphere or groundwater; and (2) to be cognizant of carbon tetrachloride concentrations and trends near the lower permeability Plio-Pleistocene layer to provide an indication of concentrations that can be expected during restart of SVE operations and to support selection of on-line wells.

The objectives of monitoring the passive soil vapor extraction system wells, which are all open near the vadose-groundwater interface, are (1) to be cognizant of the carbon tetrachloride concentrations and trends near the vadose-groundwater interface; and (2) to quantify the mass of carbon tetrachloride removed using this technology. The instrumented systems will be operated to provide a long-term record of passive extraction data, particularly contaminant concentrations in the extracted vapor and mass removal rates.

Duration: Non-operational monitoring and passive soil vapor extraction monitoring will be conducted from October 1999 through September 2000 during FY 2000. It is anticipated that the non-operational and passive extraction monitoring will be continued in FY 2001 through March 2001.

Monitoring Frequency: Monitoring will be conducted monthly. It is assumed that (1) the ERC sampler(s)/geologist will spend approximately 2 days/month collecting and analyzing samples, shipping passive GAC samples to offsite laboratories, and downloading data; and (2) the ERC technical lead will spend approximately 1 day/month analyzing and reporting the results.

Monitoring Locations: Locations were selected to focus carbon tetrachloride monitoring near the vadose-atmosphere and vadose-groundwater interfaces and near the Plio-Pleistocene layer (Table 1). At the recommendation of the ERC technical lead, and with approval from the ERC task lead, these monitoring locations could be revised based on developing trends, accessibility, and/or recommendations of the sampler. The 200-ZP-2 Unit Managers will be advised of any changes to the monitoring locations. Monitoring locations are shown on Figure 1.

Note: During FY97, FY98, and FY99, carbon tetrachloride concentrations and trends were also monitored at shallow soil vapor probes (1.5 m deep). In light of the sporadic and low concentrations detected at these shallow soil vapor probes, shallow monitoring was not included in this plan for FY2000.

Data Management: The field screening data obtained from non-operational wells and probes are entered into a controlled field logbook, which is maintained by ERC Document &

Information Services. The ERC technical lead organizes and maintains spreadsheets of the field screening data on a desk-top computer. The field screening data are included in the annual performance evaluation report.

The laboratory data obtained from the GAC samples on the 8 passive extraction wells will be entered into HEIS. A hardcopy of the data and associated paperwork will be maintained by ERC until transmitted to Hanford records holding. The data collected from the dataloggers and B&Ks are stored on ERC network drives that are backed up daily. The ERC technical lead organizes and maintains spreadsheets of all the passive extraction data on a desk-top computer. The passive extraction data will be included in the annual performance evaluation report.

References:

BHI-QA-03, ERC Quality Assurance Program Plans, Procedure 5.2, Onsite Measurements Quality Assurance Program Plan

BHI-01105: Rohay, V.J., 1997, Rebound Study Report for the Carbon Tetrachloride Soil Vapor Extraction Site, Fiscal Year 1997, BHI-01105, Rev. 0

Table 1. Distribution of Selected Monitoring Locations

Target Zone	Number of Monitoring Locations		
	Z-1A	Z-9	Total
Near-surface (3-20 m below ground surface)	5	6	11
Plio-Pleistocene (25-45 m below ground surface)	5	5	10
Groundwater (50-65 m below ground surface)	8[a]	1	9
Total	18	12	30

[a] Eight available monitoring locations near the vadose/groundwater interface in the Z-1A area are being monitored as part of the passive soil vapor extraction system network. The passive network also includes an additional 12 wells and probes that are monitored only for pressures (Table 3).

Table 2. Wells and Probes Selected for Non-Operational Monitoring and Passive Soil Vapor Extraction Monitoring

Target Zone	Z-9	Depth (m)	Comment	Z-1A	Depth (m)	Comment
near-surface	CPT-17 10 ft (blue)	3	southwest of Z-9	CPT-32 25 ft (green)	8	west of Z-1A
near-surface	CPT-18 15 ft (white)	5	northwest of Z-9	CPT-30 28 ft (green)	9	north of Z-18 (middle of Z-1A/Z-18/Z-12 field)
near-surface	CPT-16 25 ft (blue)	8	east of Z-9	CPT-13A 30 ft (blue)	10	southeast of Z-1A
near-surface	CPT-27 33 ft (red)	10	southeast of Z-9	CPT-7A 32 ft (yellow)	10	farfield northeast of Z-1A
near-surface	CPT-21A 45 ft (green)	14	south of Z-9	CPT-1A 35 ft (black)	11	west of Z-12
near-surface	CPT-9A 60 ft (blue)	18	farfield north of Z-9			
Plio-Pleisto	W15-82	25	east side of Z-9	W18-152	34	northwest corner of Z-12
Plio-Pleisto	W15-95	25	north side of Z-9	W18-158L	37	within Z-1A
Plio-Pleisto	CPT-21A 86 ft (red)	26	south of Z-9	W18-167	37	within Z-1A
Plio-Pleisto	CPT-28 87 ft (red)	27	farfield south of Z-9	W18-249	41	northeast corner of Z-18
Plio-Pleisto	W15-217	35	southwest corner of Z-9	W18-248	41	east side of Z-1A
Gw	W15-9L	57	north of Z-9, 11 m from W15-32 extraction well	W18-6L*	60	west side of Z-1A
Gw				W18-7*	57	east side of Z-1A
Gw				W18-10L*	55	east side of Z-18
Gw				W18-11L*	60	Z-18
Gw				W18-12*	60	Z-18
Gw				W18-246L*	52	west of Z-1A
Gw				W18-247L*	51	southeast of Z-18
Gw				W18-252L*	53	west of Z-1A (middle of Z-1A/Z-18/Z-12 field)

* Passive soil vapor extraction wells (Table 3)
Note: Colors refer to the color coding on the soil vapor probe tubing.

Table 3. Passive Soil Vapor Extraction Well Network

Well/Probe	Purpose	Instrumentation Parameter	Comment	Open Interval (m bgs)
299-W18-7	Extraction	Carbon Tetrachloride (GAC)		51 – 62
299-W18-6U	Monitoring	Differential Pressure	Sealed well	29 – 38
299-W18-6L	Extraction	Differential Pressure	two 60-m lengths of sample tubing dropped in well	58 – 61
		Airflow		
		Temperatures at 3 m, 60 m below top of well		
		Carbon Tetrachloride (B&K)		
		Carbon Tetrachloride (GAC)		
299-W18-9	Monitoring	Differential pressure	Sealed well	55 – 64
		Temperatures at 3 m, 60 m below top of well		
299-W18-10L	Extraction	Carbon Tetrachloride (GAC)		45 – 64
299-W18-11L	Extraction	Carbon Tetrachloride (GAC)		55 – 65
299-W18-12	Extraction	Carbon Tetrachloride (GAC)		54 – 65
299-W18-246L	Extraction	Carbon Tetrachloride (GAC)		50 – 53
299-W18-247L	Extraction	Differential pressure	Well with long passive extraction record	49 – 52
		Airflow		
		Temperatures at 3 m, 60 m below top of well		
		Carbon Tetrachloride (B&K)		
		Carbon Tetrachloride (GAC)		
299-W18-247U	Monitoring	Differential pressure	Sealed well	36 – 39
299-W18-252L	Extraction	Differential pressure		50 – 56
		Airflow		
		Temperatures at 3 m, 60 m below top of well		
		Carbon Tetrachloride (B&K)		
		Carbon Tetrachloride (GAC)		
		Barometric pressure		
299-W18-252U	Monitoring	Differential pressure	Sealed well	34 – 41
299-W18-252/SST100 (red)	Monitoring	Differential pressure	Stainless steel tubes strapped to outside of casing	30
299-W18-252/SST145 (blue)	Monitoring	Differential pressure		44
299-W18-252/SST210 (yellow)	Monitoring	Differential pressure		64
CPT-4F/10 (black)	Monitoring	Differential pressure	Soil probes emplaced using cone penetrometer	3
CPT-4F/25 (white)	Monitoring	Differential pressure		8
CPT-4F/50 (blue)	Monitoring	Differential pressure		15
CPT-4F/75 (yellow)	Monitoring	Differential pressure		23
CPT-4F/109 (red)	Monitoring	Differential pressure		33

Note: Colors refer to the color coding on the soil vapor probe tubing.

Figure 1. Location of Wells and Probes Selected for Non-Operational Monitoring and Passive Soil Vapor Extraction Monitoring

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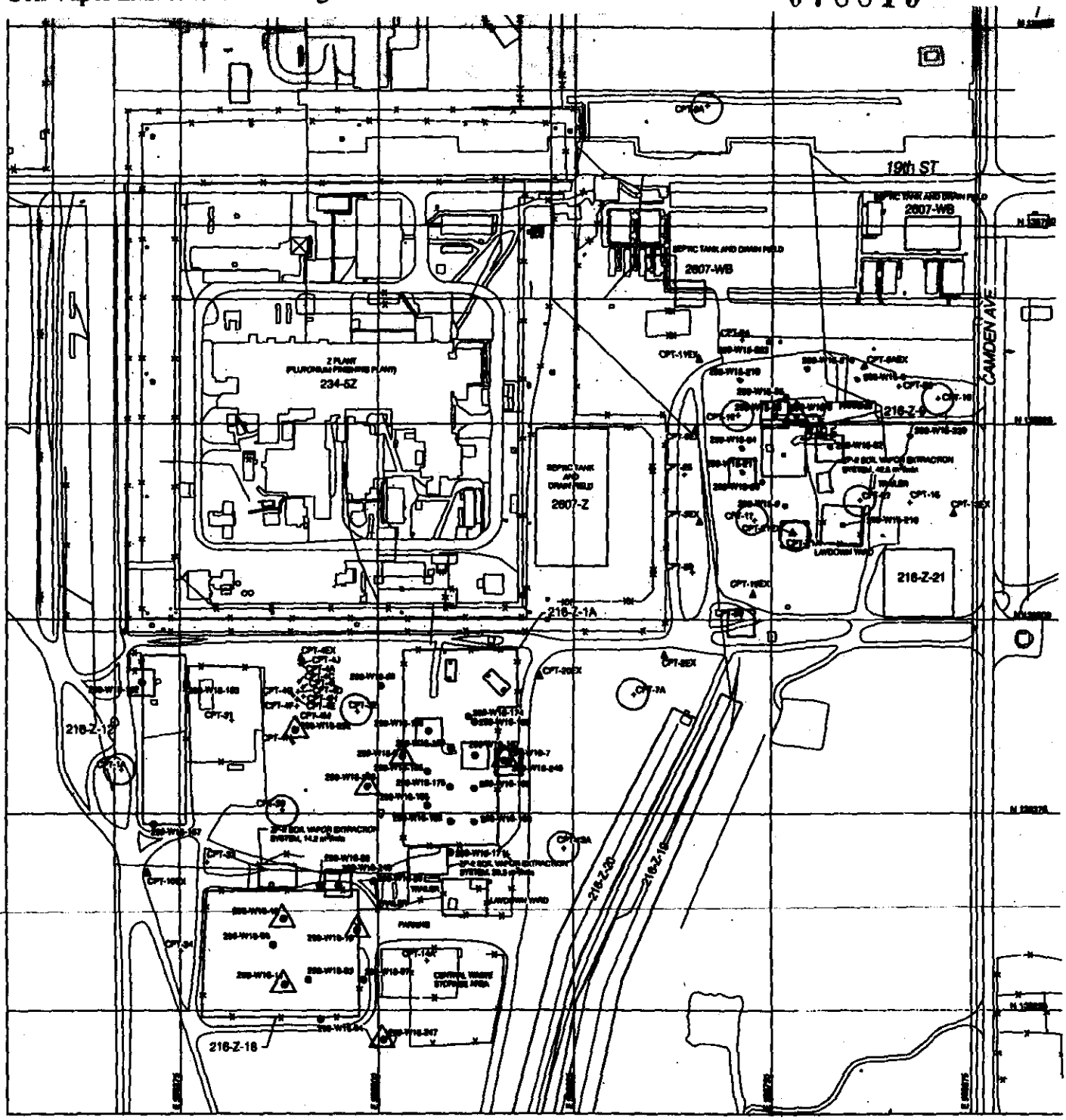

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